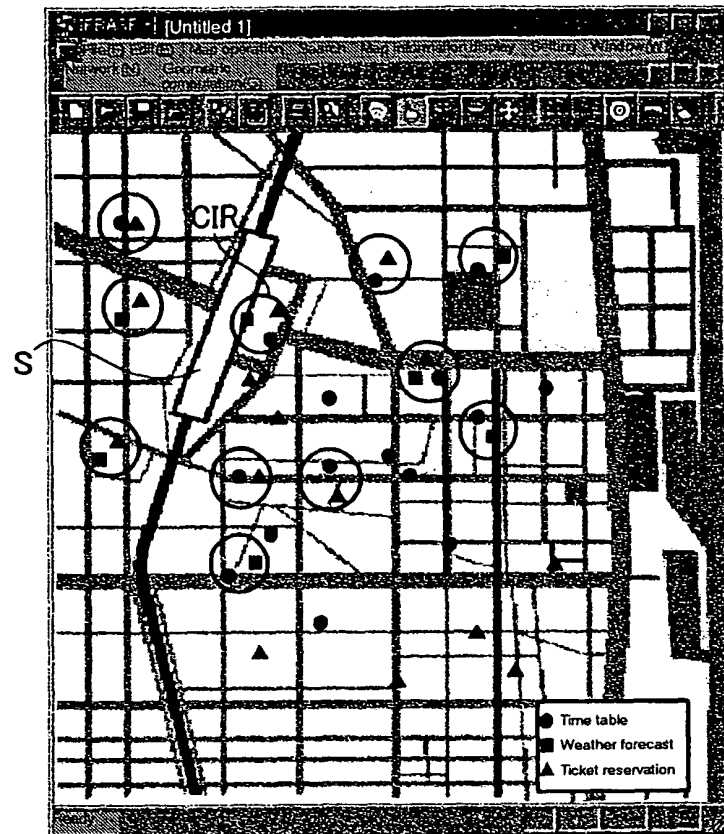


[Document type] Drawing

[Figure 1]

(1/27)



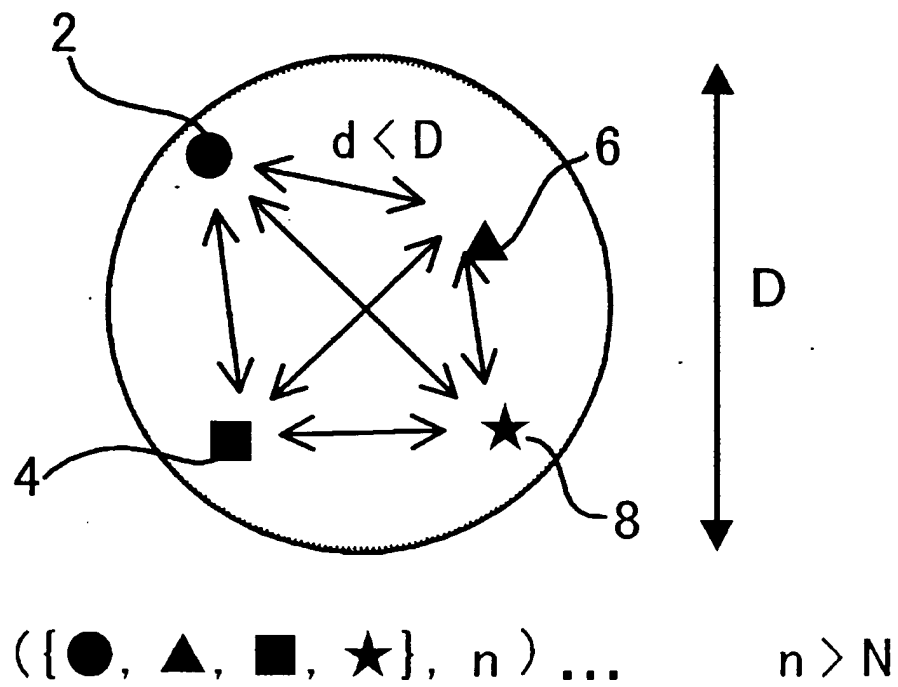
[Figure 2]

(2/27)

Record number	Transaction ID	Position	Service name	Number of transmitted packets	...
1	ab12ef	(x ₁ ,y ₁)	Weather forecast	2	...
2	gh34lm	(x ₂ ,y ₂)	Time table	1	...
3	no56rs	(x ₃ ,y ₃)	Ticket reservation	4	...
4	tu78xy	(x ₄ ,y ₄)	Time table	1	...

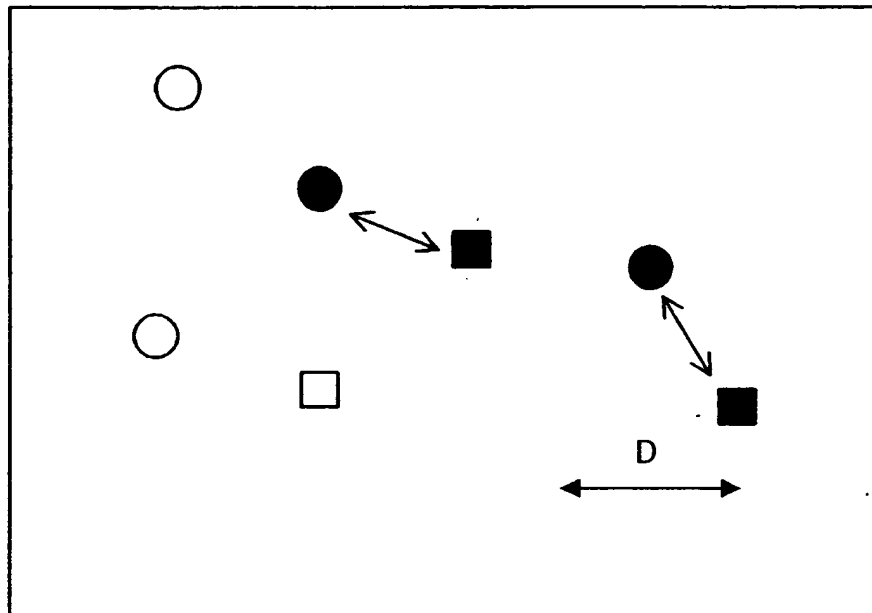
[Figure 3]

(3/27)

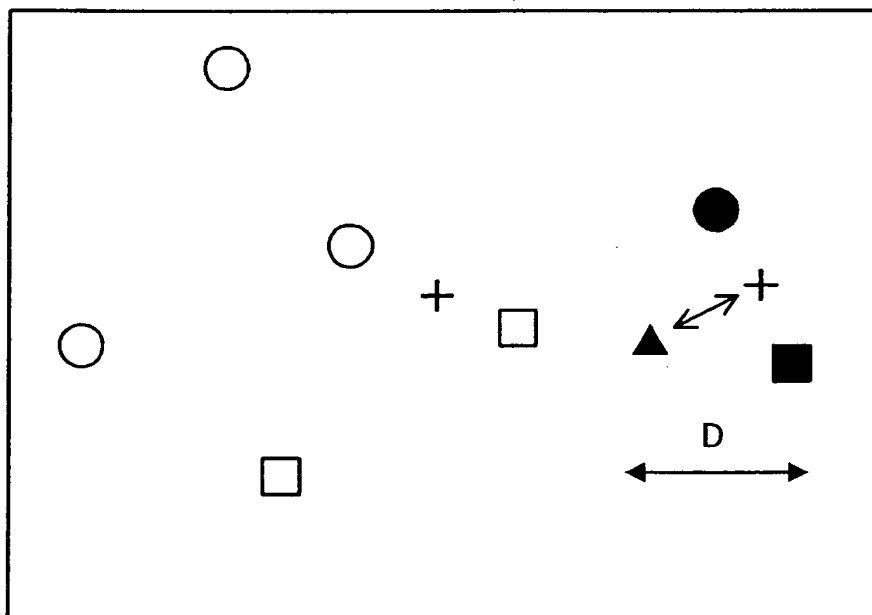


[Figure 4]

(4/27)



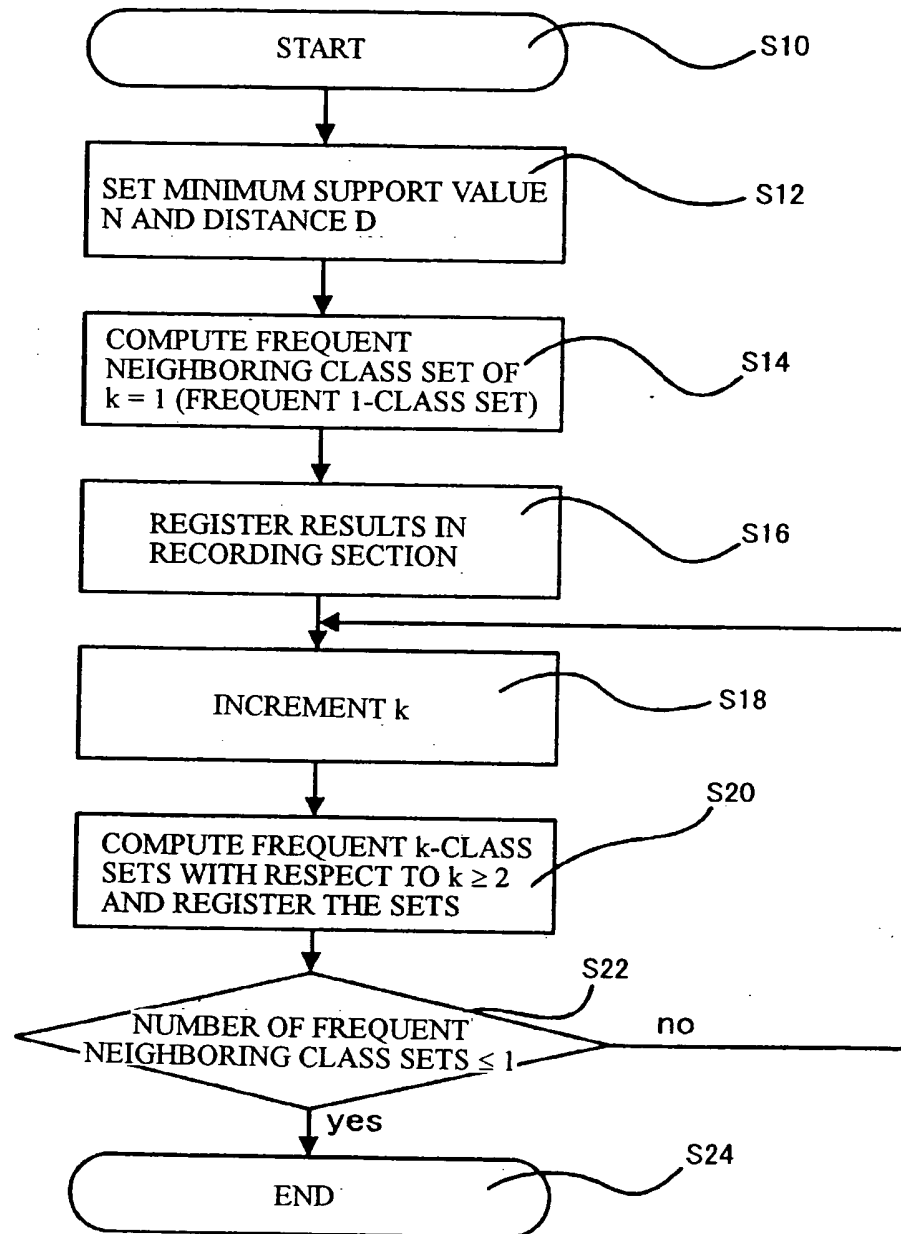
(a)



(b)

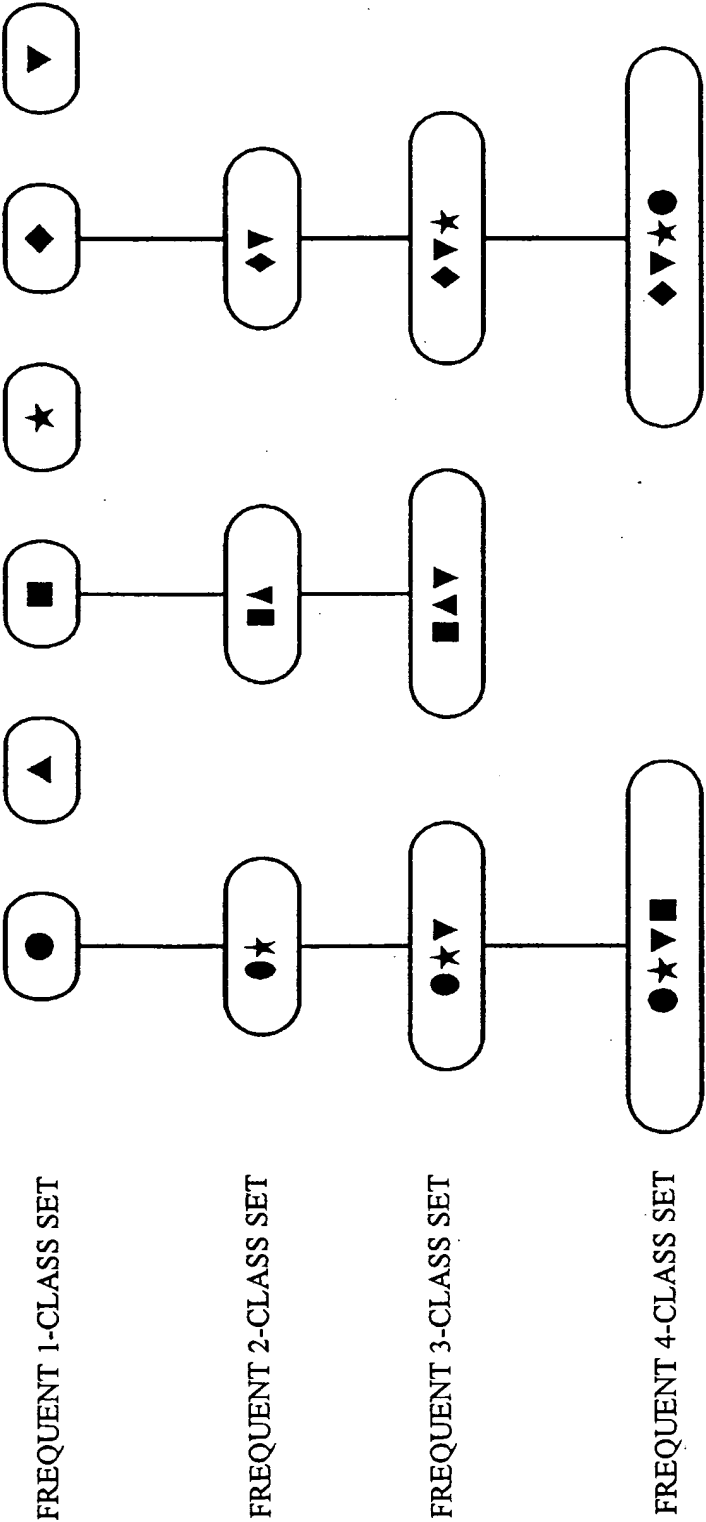
[Figure 5]

(5/27)



[Figure 6]

(6/27)



[Figure 7]

(7/27)

For (i=1; i≤m; i++)

/ Compute centroids of instances in proximity to frequent k-class set $C_k[i] \in S_k$

Obtain set G_i of centroids of instances /

/ Form voronoi diagram of G_i /

For j=i+1; i≤m; j++

/ Set $C_k[i] \in S_k$ as another neighboring k-class set /

/ Set $C_{k+1}[i,j]$ as neighboring class set formed of sum-set $C_k[i] \cup C_k[j]$ of two frequent neighboring class sets /

If total k number of class sets formed from $|C_{k+1}[i,j]|=k+1$ and $C_{k+1}[i,j]$ are frequent

$\text{sup}(C_{k+1}[i,j])=0$

Mark all instances of $C_k[i]$ as invalid

Set closest distance from all instances of $C_k[i]$ to $C_k[j]$ instance as ∞

For (with respect to each instance of $C_k[j]$)

Set p_i to point of $p_i \in C_k[j]$ and $p_i \in C_k[i]$

Search for nearest centroid $g_{\text{nearest}} \in G_i$ from p_i

Set found instance with respect to centroid as l_{nearest}

Check If $p_i \in l_{\text{nearest}}$ ($i=1, \dots, k$) is $\text{dist}(p_i, p_{ii}) < D$

/ If all points of l_{nearest} satisfy the above inequality?

If l_{nearest} is marked "Invalid"

Mark "Neighboring to p_i "

Increment $\text{sup}(C_{k+1}[i,j])$ by 1

Set nearest distance to $C_k[j]$ instance to $\text{dist}(g_{\text{nearest}}, p_i)$

If $\text{dist}(g_{\text{nearest}}, p_i)$ is smaller than nearest distance to present $C_k[j]$ instance

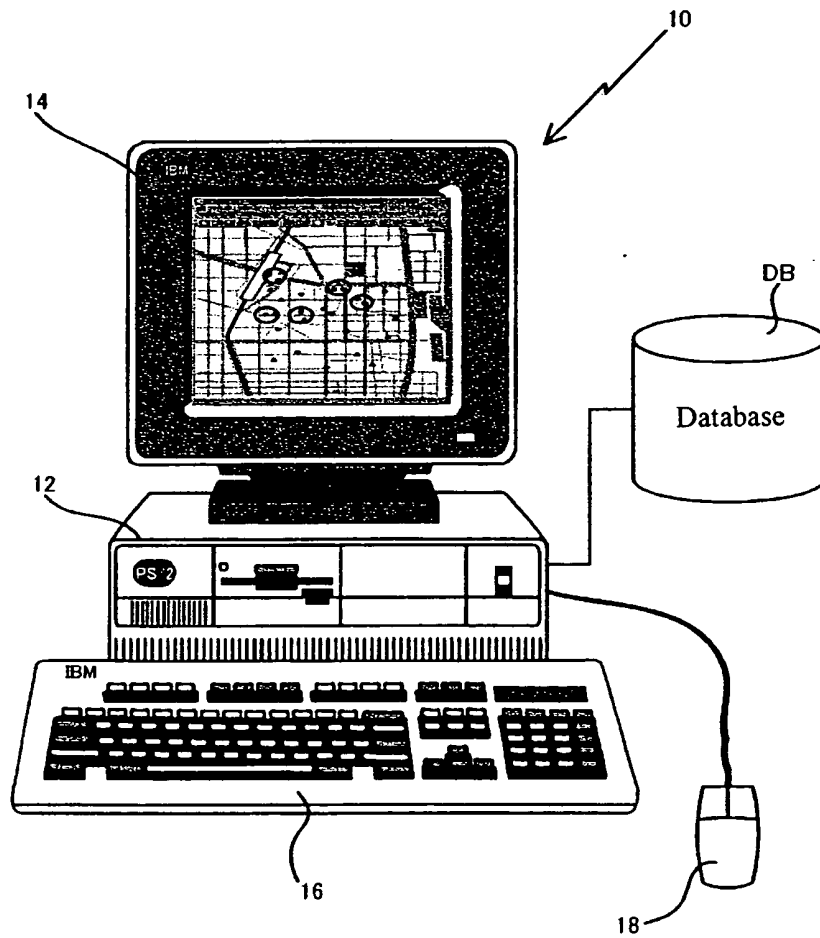
Update nearest distance and mark "Neighboring to p_i "

If $\text{sup}(C_{k+1}[i,j]) > N$

Form instance of $C_{k+1}[i,j]$ from instance of $C_k[i]$ marked "Neighboring" and add $C_{k+1}[i,j]$ to S_{k+1}

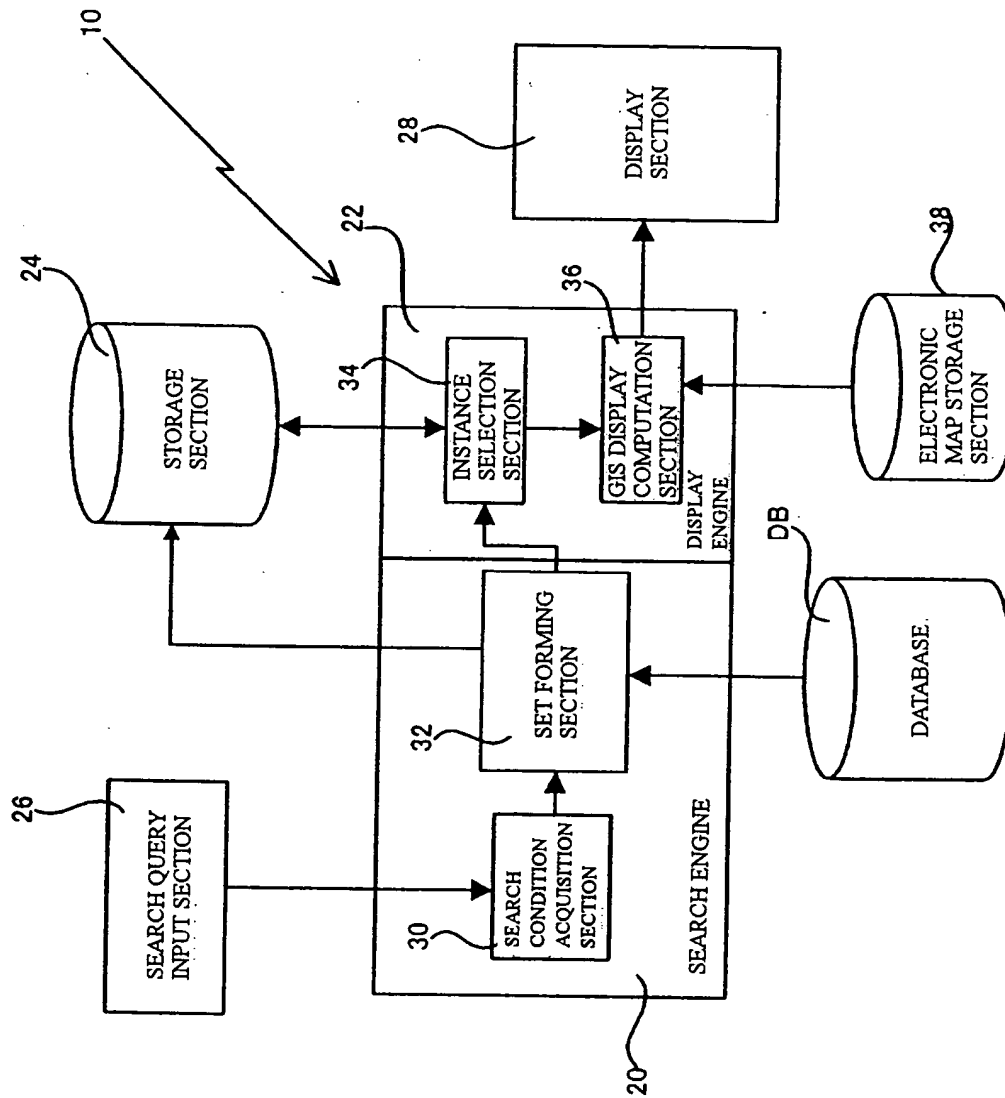
[Figure 8]

(8/27)



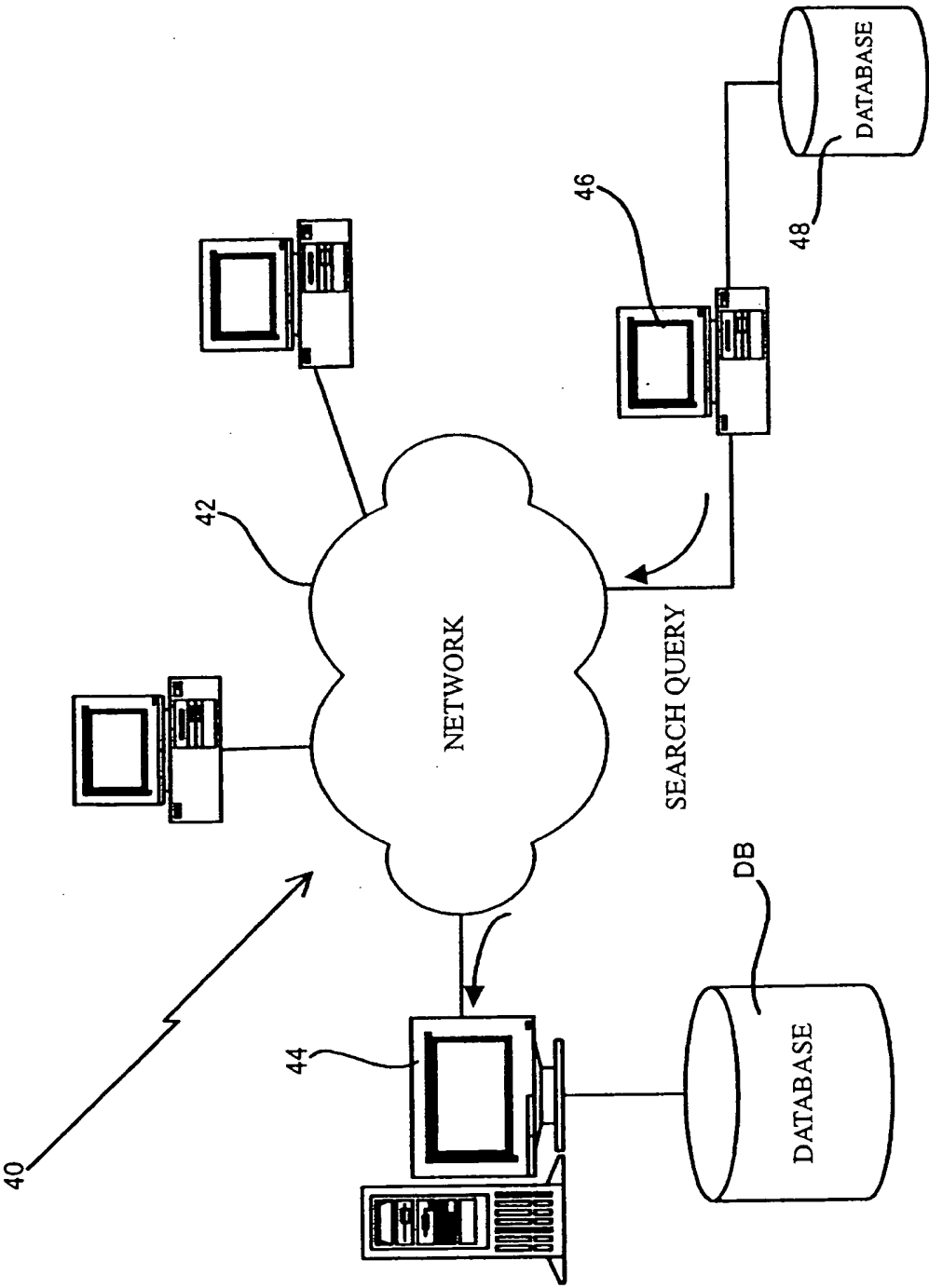
[Figure 9]

(9/27)



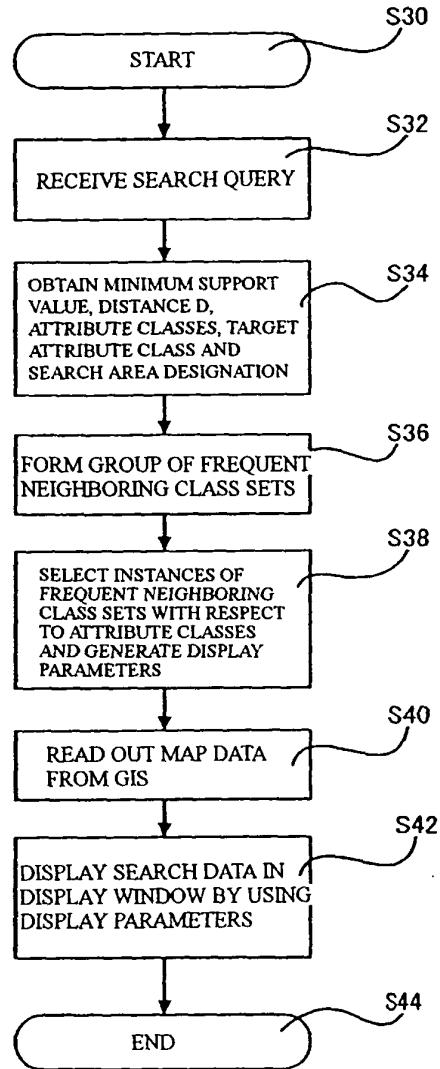
[Figure 10]

(10/27)



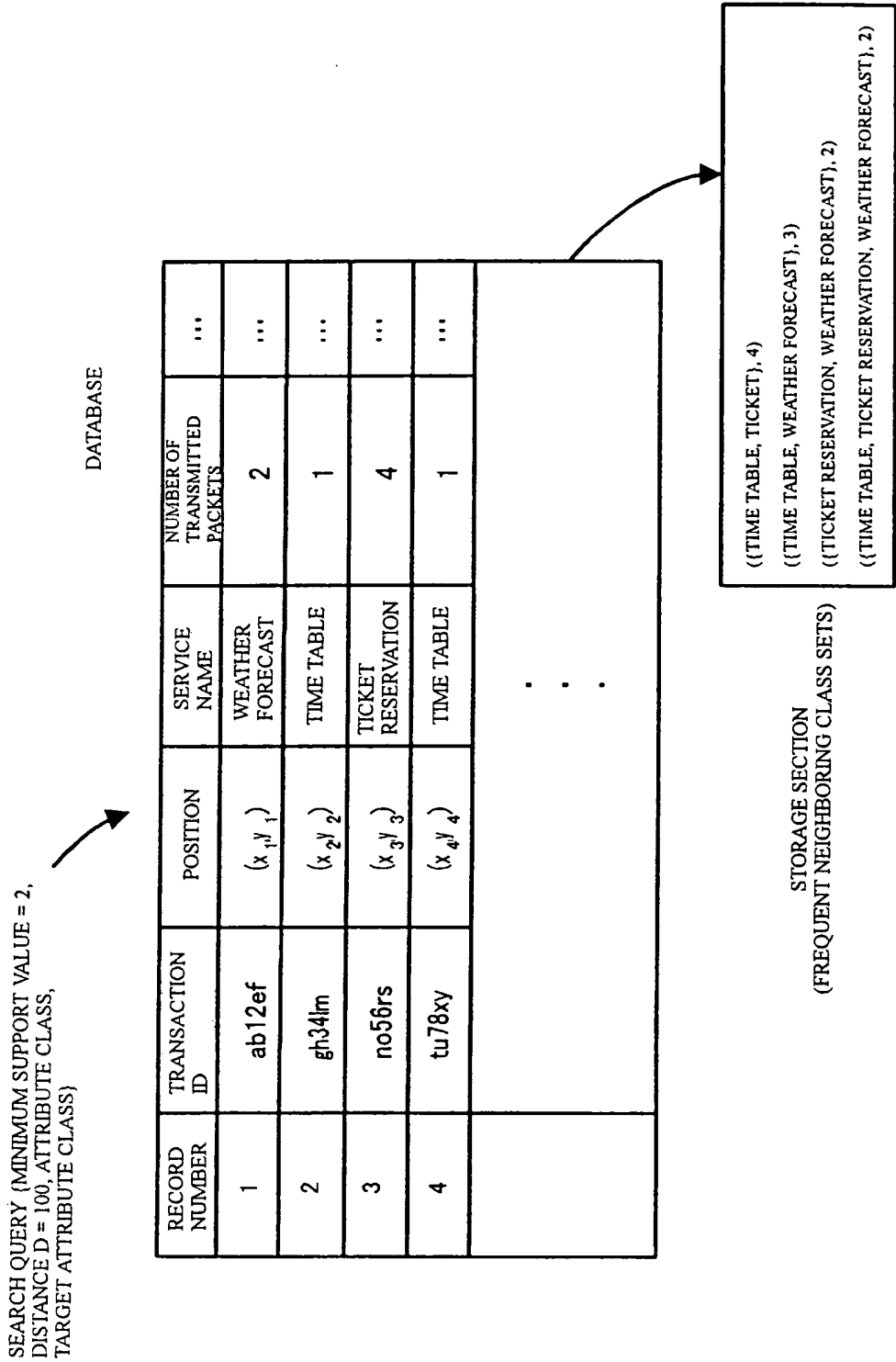
[Figure 11]

(11/27)

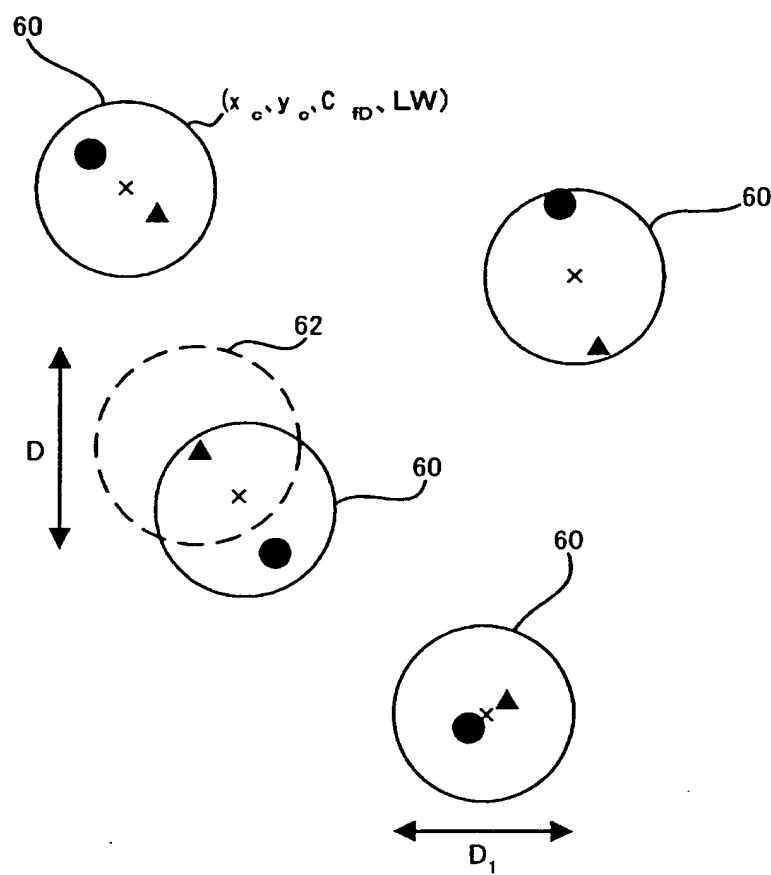


[Figure 12]

(12/27)

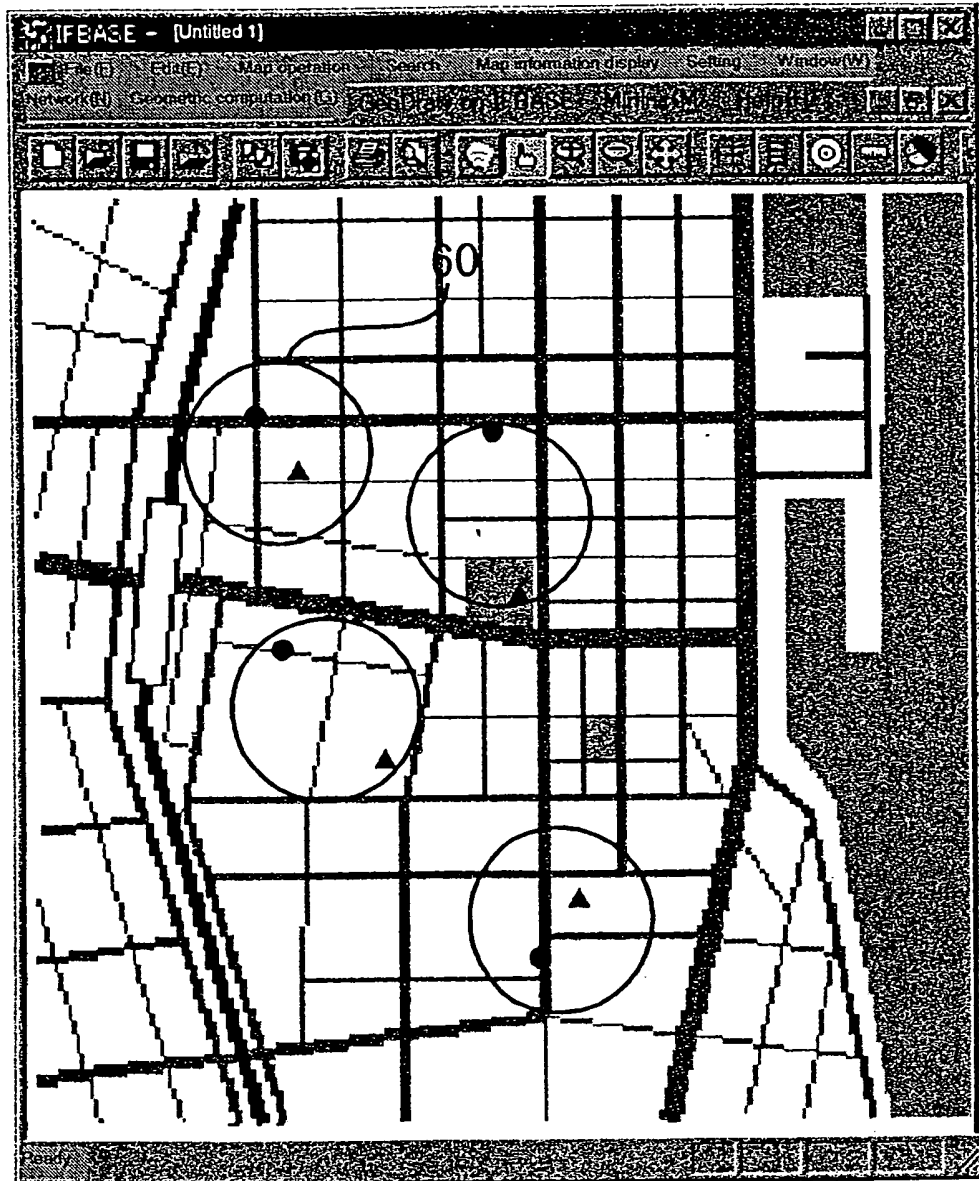


[Figure 13]



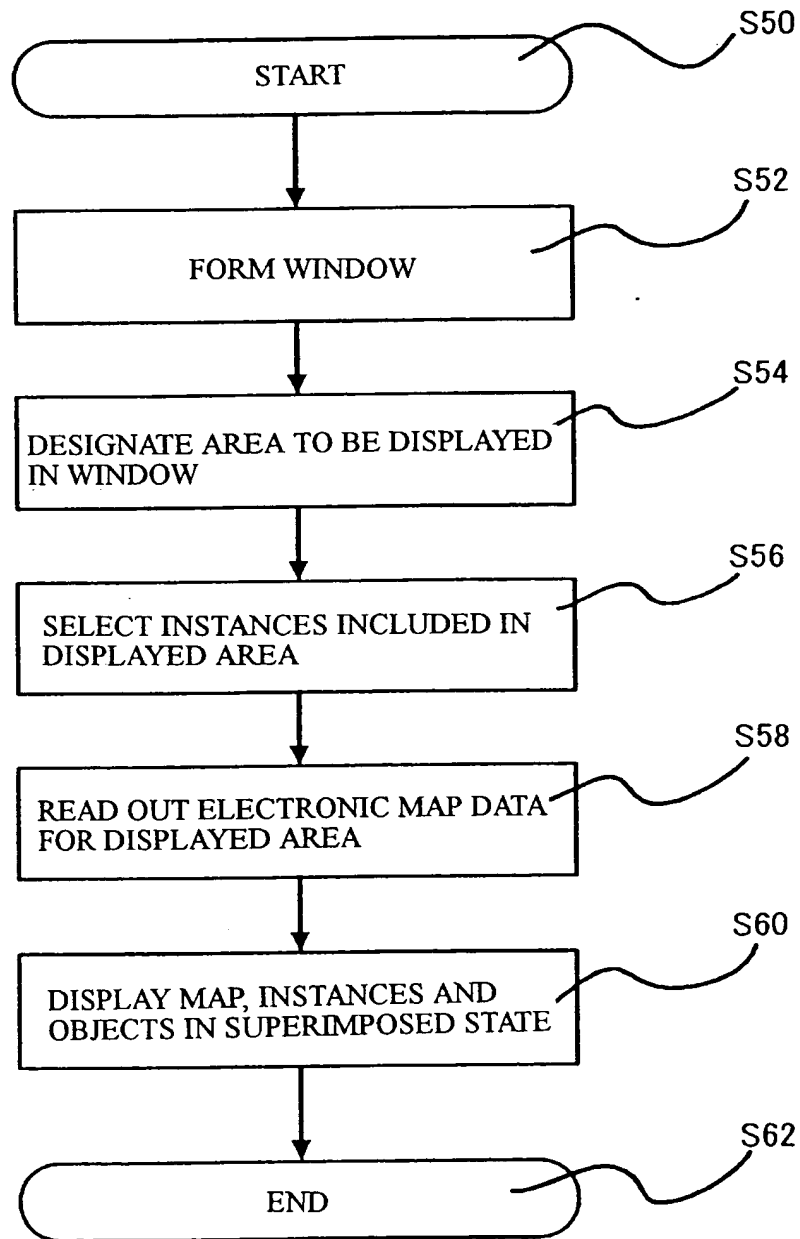
[Figure 14]

(14/27)



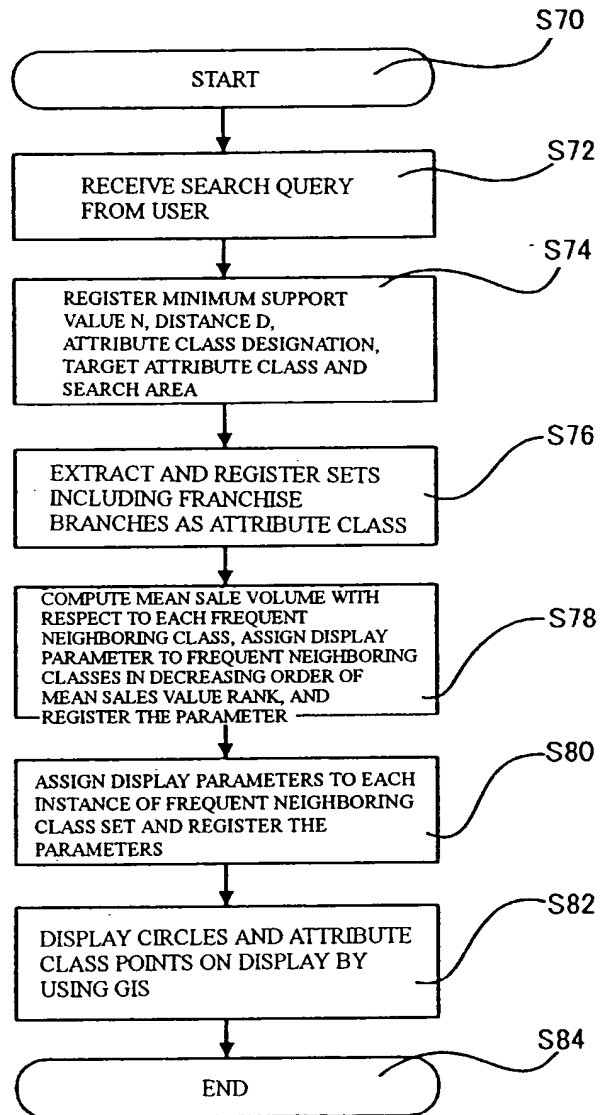
[Figure 15]

(15/27)



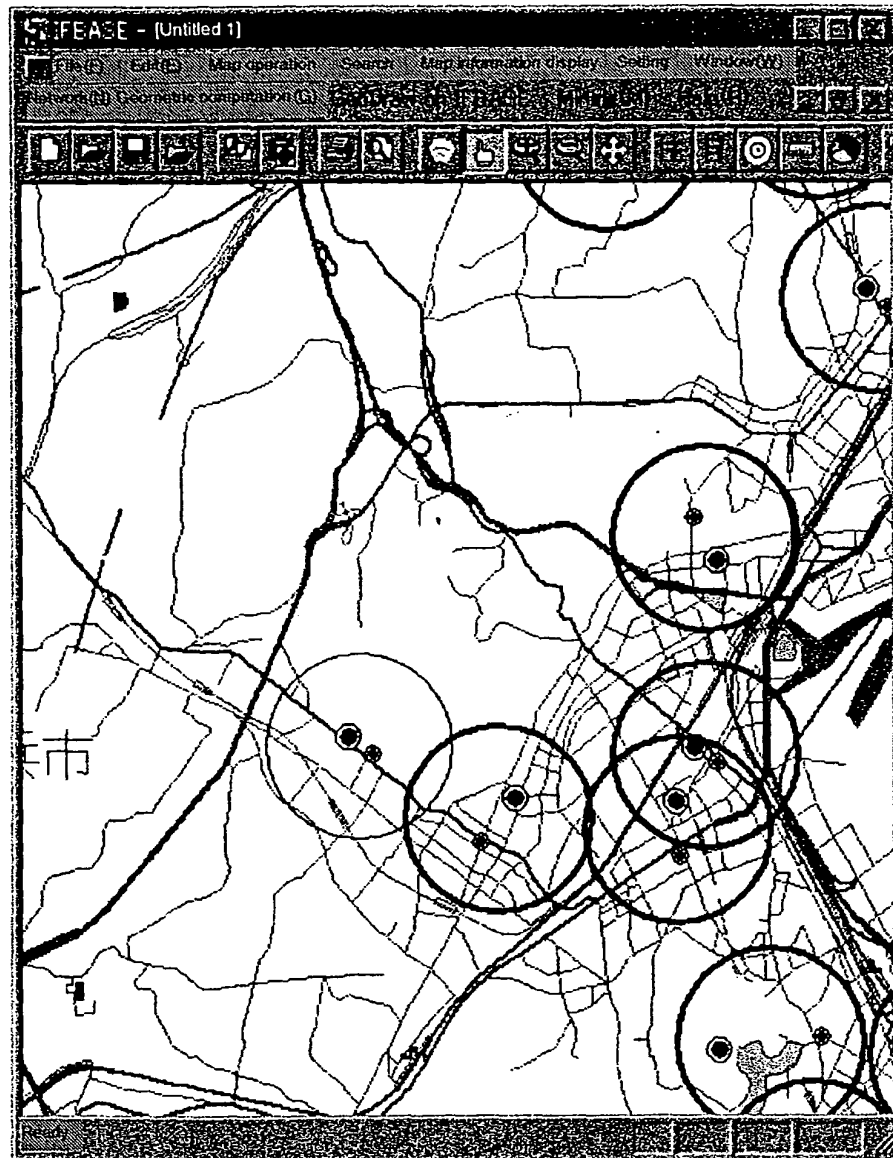
[Figure 16]

(16/27)



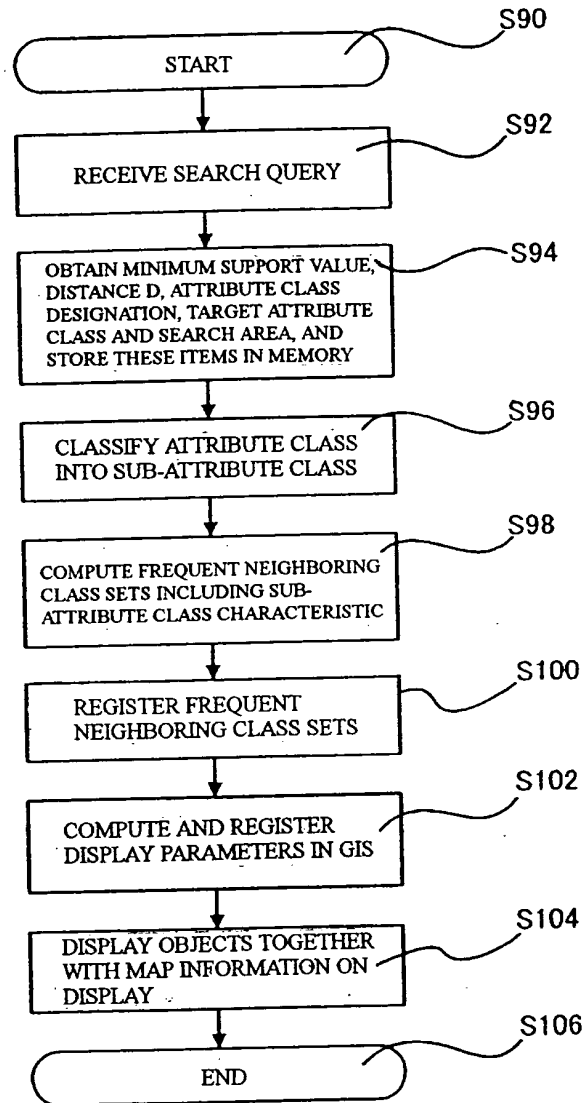
[Figure 17]

(17/27)



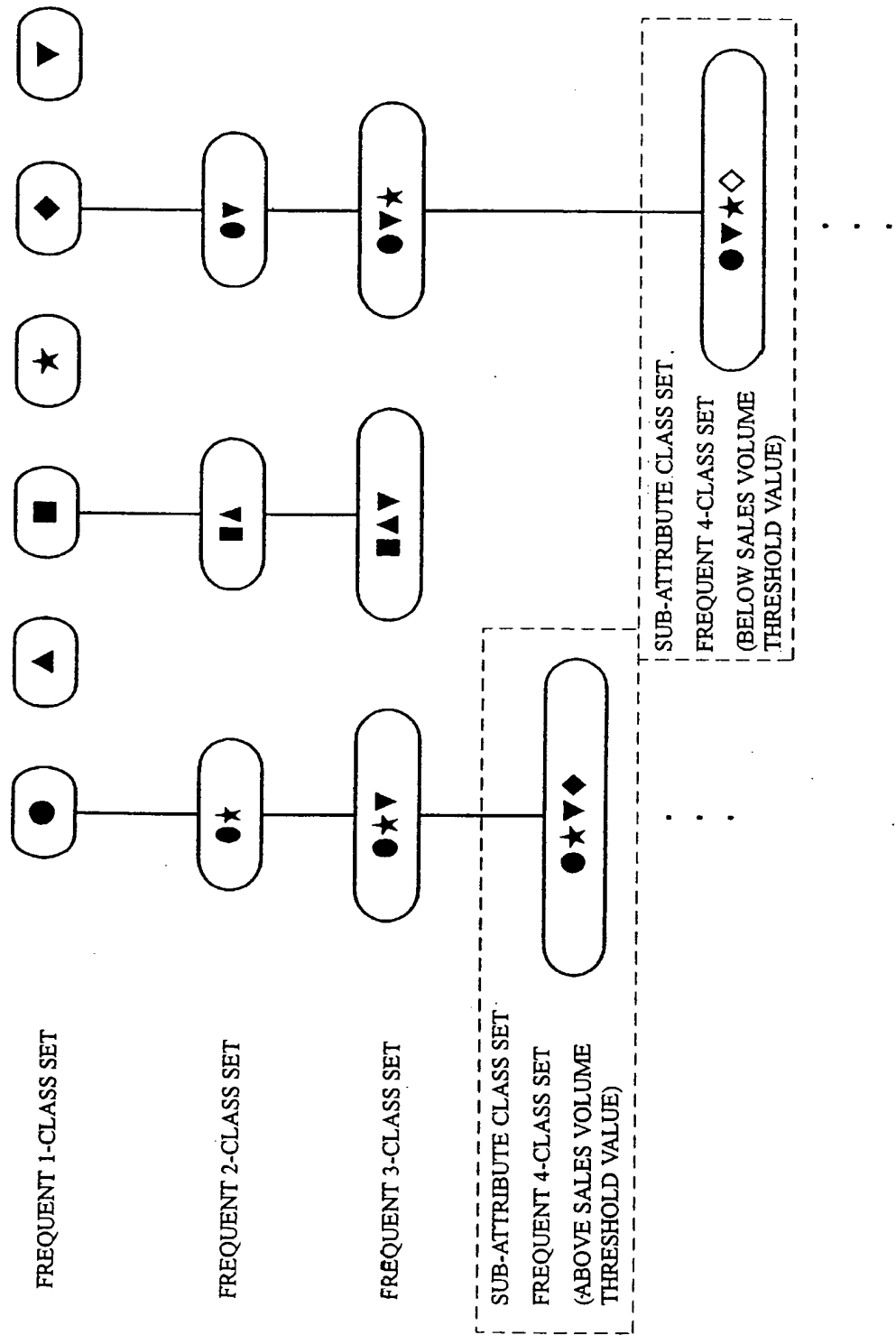
[Figure 18]

(18/27)



[Figure 19]

(19/27)



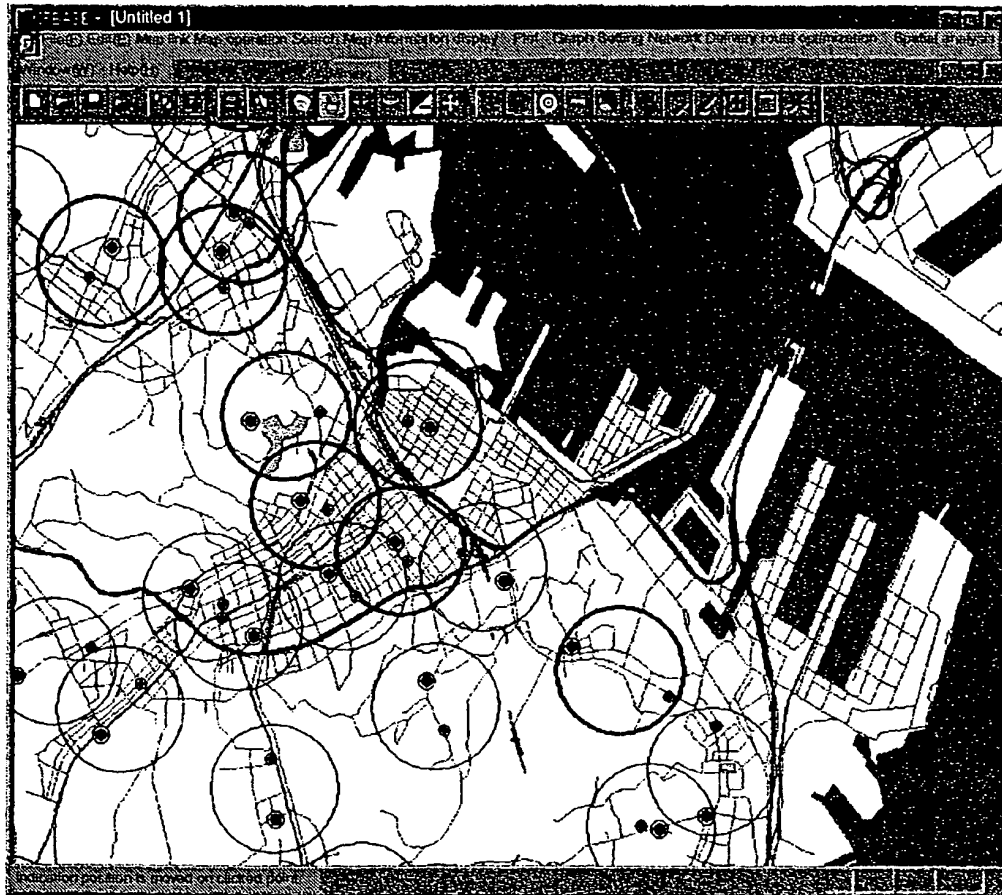
[Figure 20]

(20/27)

	SUB-ATTRIBUTE CLASS		TOTAL NUMBER OF INSTANCES
	HIGH-SALES BRANCH	LOW-SALES BRANCH	
NUMBER OF INSTANCES OF FREQUENT NEIGHBORING CLASS SETS INCLUDING A	x	y	$x+y$
NUMBER OF INSTANCES OF FREQUENT NEIGHBORING CLASS SETS NOT INCLUDING A	$n1-x$	$n2-y$	$N-(x+y)$
TOTAL	$n1$	$n2$	N

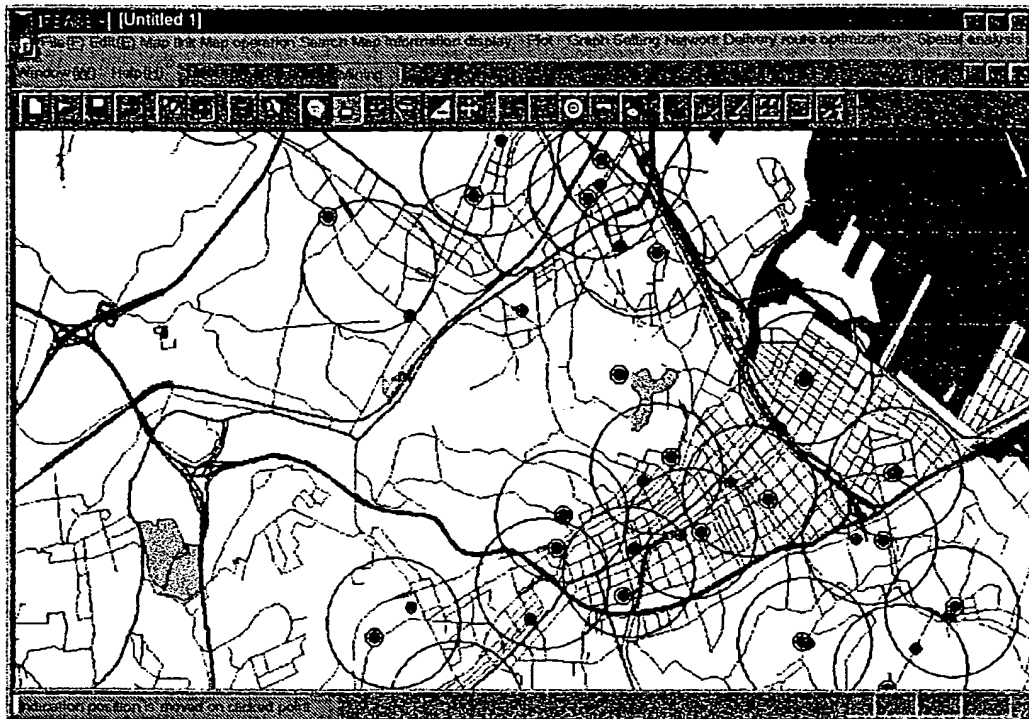
[Figure 21]

(21/27)



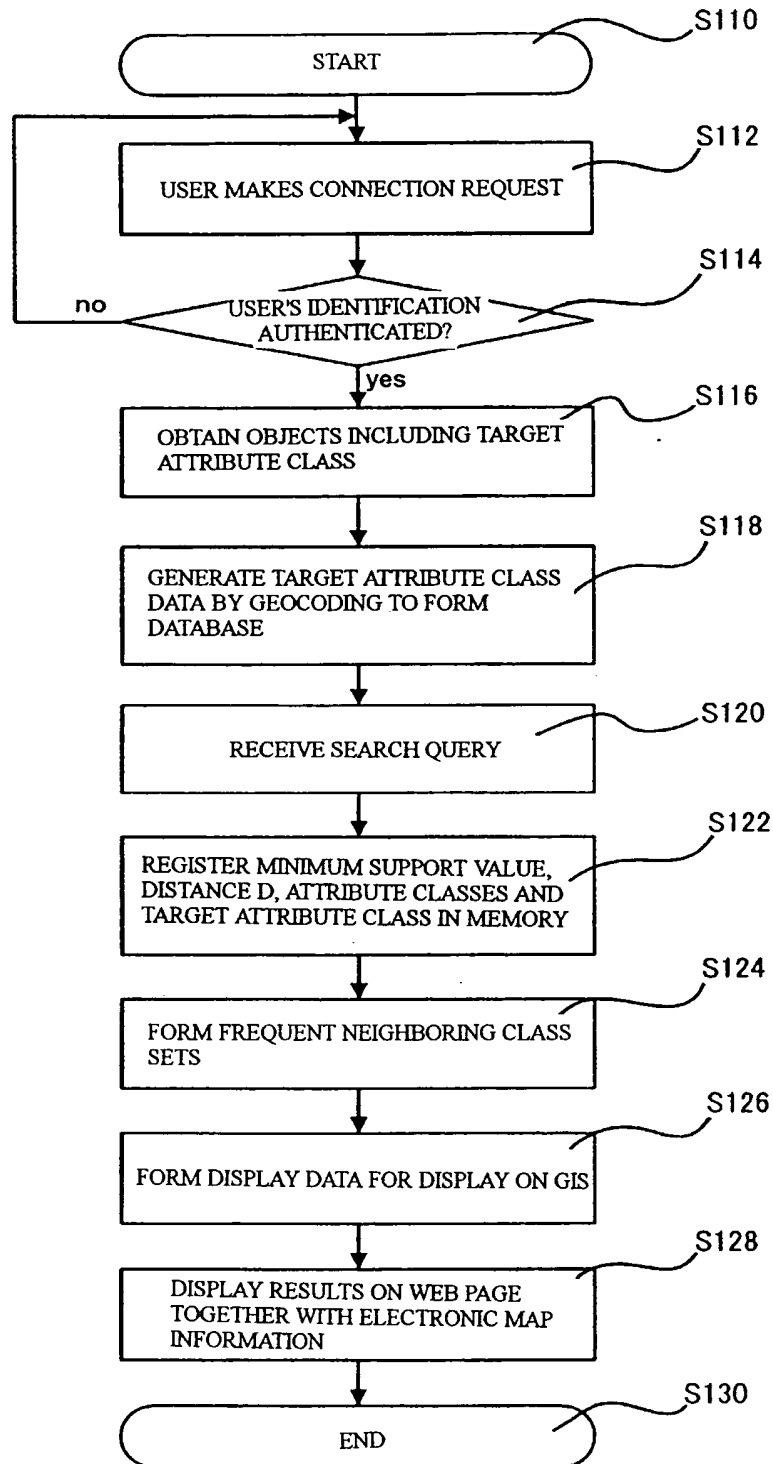
[Figure 22]

(22/27)



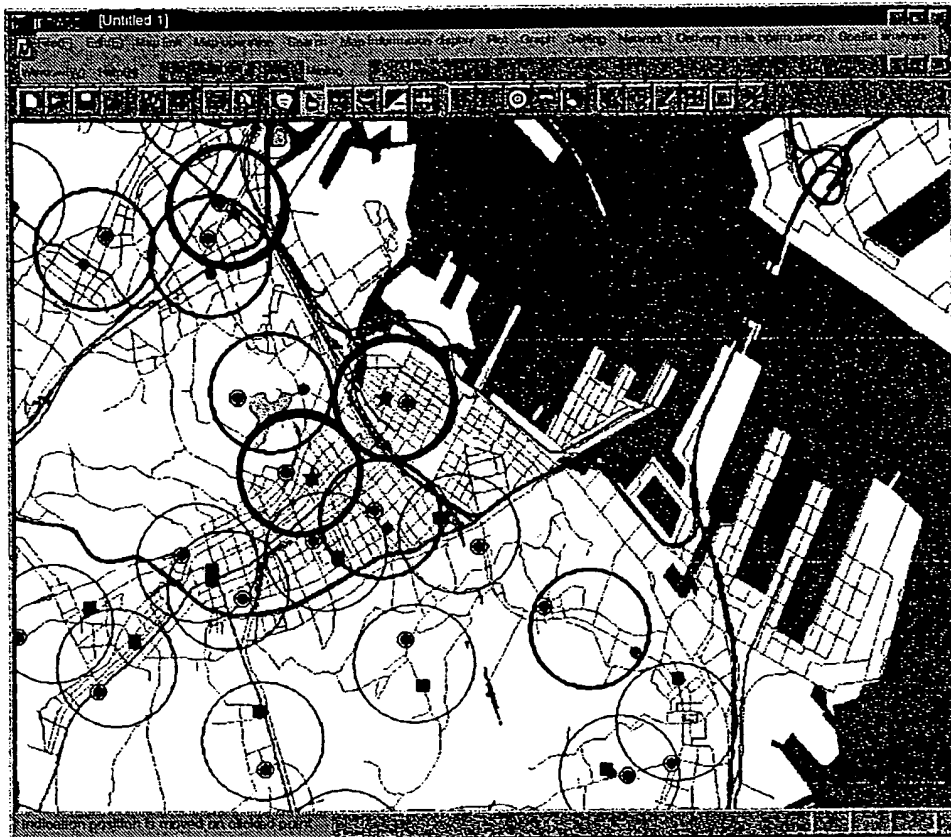
[Figure 23]

(23/27)



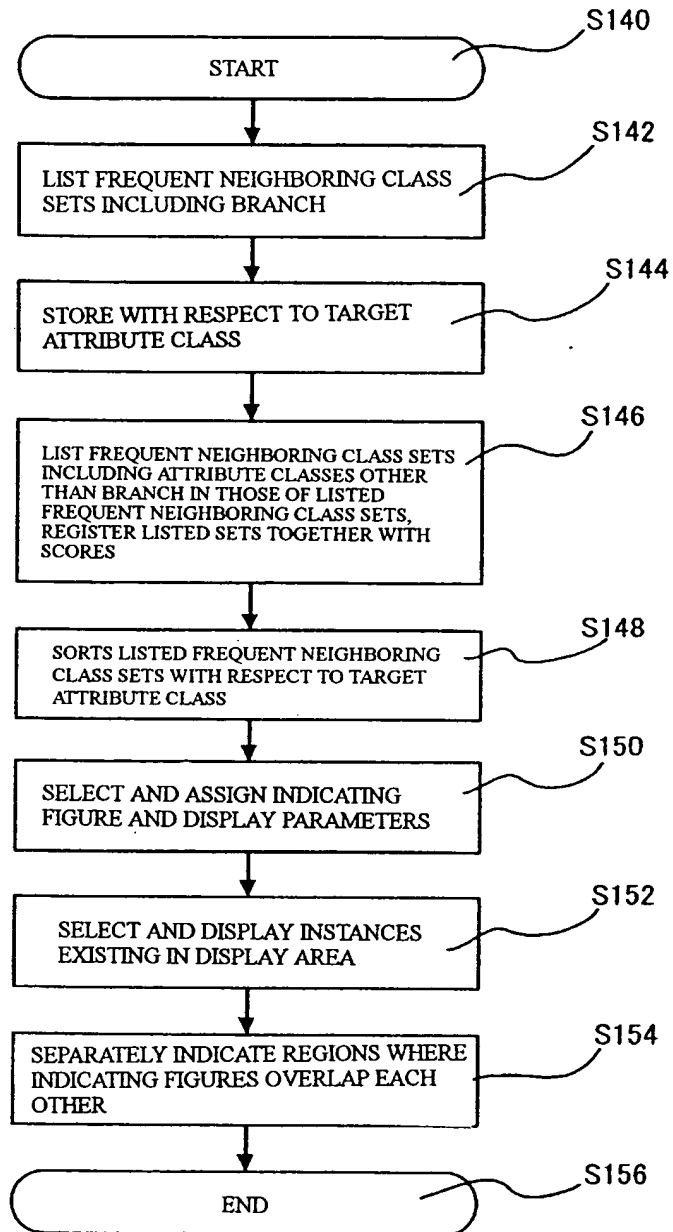
[Figure 24]

(24/27)



[Figure 25]

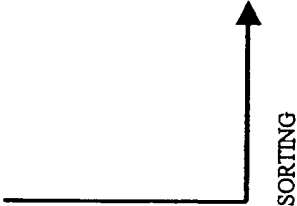
(25/27)



[Figure 26]

(26/27)

FREQUENT NEIGHBORING CLASS SET	INSTANCE LIST	MEAN SALES VOLUME (TEN THOUSAND YEN)
{BRANCH, A, B, C, D}	I1, I2, I3	482
{BRANCH, A, B, C}	I4, I5, I6, I7, I8	495
{BRANCH, A, B}	I9, I10, I11, I12, I13,....	280
{BRANCH, A }	I21, I22, I23, I24, I25,....	310
	.	
	.	
	.	



SALES VOLUME	INSTANCE LIST	DISPLAY PARAMETER
495	I4, I5 , I6, I7 , I8	LW=3
482	I1 I2, I3	LW=2
310	I21, I22 , I23 , I24, I25 ,....	LW=1
	.	
	.	
	.	

[Figure 27]

(27/27)

